Sternal Nonunion and Infection

Daniel Raymond, MD
Terminology

• Deep Sternal Wound Infection (DSWI)
  1. Organism isolated from culture of mediastinal tissue or fluid
  2. Evidence of mediastinitis seen during operation
  3. Presence of chest pain, sternal instability or fever and (one of the following):
     a. Purulent drainage from the mediastinum
     b. bacteremia
     c. positive deep wound culture

• In contrast to Superficial Sternal Wound Infection (SSWI)
Impact

- Incidence: 1 - 5%
- Associated Mortality: 10-47% (double!)
- LOS increase: 20 d
- Cost: 2.8x increase
## Factors Associated with DSWI

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratio</th>
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<tbody>
<tr>
<td>Male</td>
<td>1-2</td>
</tr>
<tr>
<td>Obesity</td>
<td>3-6</td>
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<tr>
<td><strong>Diabetes</strong></td>
<td>2-5</td>
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<tr>
<td>Smoking</td>
<td>2-3</td>
</tr>
<tr>
<td>COPD</td>
<td>3-4</td>
</tr>
<tr>
<td>Heart Failure/NYHA class 3 to 4</td>
<td>1.5 - 3</td>
</tr>
<tr>
<td>Low EF</td>
<td>3</td>
</tr>
<tr>
<td><strong>Renal Failure</strong></td>
<td>6</td>
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<tr>
<td>PVD</td>
<td>3-4</td>
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<tr>
<td><strong>Coronary Surgery</strong></td>
<td>3-6</td>
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<tr>
<td>BIMA utilization</td>
<td>3-4</td>
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<tr>
<td><strong>Re-exploration</strong></td>
<td>3-9</td>
</tr>
<tr>
<td>Re-do Surgery</td>
<td>2-3</td>
</tr>
<tr>
<td>Prolonged Inotropes</td>
<td>2-4</td>
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</tbody>
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Presentation

1. Overt signs & symptoms of wound infection
2. Sternal instability - “click”
3. Sternal pain
4. Radiographic Findings
Late Presentation
Means of Prevention

• Pre-op nasal culture
• Glucose control
• IMA graft skeletonization
• Use of BIMA?
• Minimize re-op
• Advanced closure techniques
• Sternal precautions
• Appliances (e.g. postthorax)
Treatment

- Wound vac
- Closed suction and irrigation
- Negative pressure wound therapy
- Flap coverage - pectoralis, rectus abdominis, momentum
  - decreased morbidity and mortality when compared to traditional debridement and rewire
- Rigid Fixation
Robicsek Weave - The Traditional Repair
Rigid Sternal Fixation
Advantages of Rigid Fixation

- Posterior exposure not required
- Rigid fixation superior biomechanically to circlage
- Less ischemia and nerve damage
- Multiple anchor points to distribute tension
- May decrease wound complications in high risk patients
Disadvantages

- COST!!!
- Trans-sternal injury
- Screw migration
Case Presentation

• 63 yo former smoker underwent CABG5 12/2010
  • Experienced clicking and pain post-op
Re-op with Rewire and Plate
Presented to CC

- Pain and clicking in sternum
- Neuropathic pain along right sternal border
- Unable to abduct Right arm beyond 45 degrees

- Seen in conjunction with Dr. Gastman in Plastic Surgery and the Pain Service
Taken to the OR

1. Excise all overlying scar
2. Freshen edges of sternum with sternal saw
3. Measure depth of sternum and compare with CT
4. Plate sternum
5. Pectoralis advancement Flaps
6. JP drains and close
Follow Up

• Patient last seen 7/30/14

• Still c/o pain in chest wall and shoulder but able to return to work

• Undergoing PT (insurance willing)

• “I have my life back”